AN ANALYSIS OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN WITH INSTITUTIONALIZED MENTAL DEFECTIVES

By

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This dissertation is humbly dedicated to my wife, my son, and my parents.

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CHAPTER I

INTRODUCTION

In 1949 the Wechsler Intelligence Scale for Children (WISC) was introduced to the psychological world as a new and improved instrument for assessing the intelligence of children and adolescents. It is a downward extension and modification of the Wechsler-Bellevue Intelligence Scales. Wechsler (19) stated the following in his WISC Manual: ". . . most of the items in the WISC are from Form II of the earlier scales, the main additions being new items at the easier end of each test to permit examination of children as young as five years of age." He pointed out that, "Even though the materials overlap, the WISC is a distinct test from the Wechsler-Bellevue Scales and is independently standardized. The scales overlap in usefulness since both scales can be used with adolescents. However, it is expected that the WISC will be preferred in testing adolescents up through the age of fifteen years."

It is apparent that the WISC has been widely accepted in this country and abroad. Now, approximately ten years later, it and the Stanford-Binet Scales appear to be the two most often used individual tests for measuring the intelligence of children. It is used in clinics, hospitals, schools, and mental institutions of all types. Although there were only fifty-five feebleminded

cases included in the original standardization sample of 2200 boys and girls, the WISC is administered to children with subnormal intelligence in hospitals and training schools throughout the country. When the author corresponded with psychologists and superintendents at approximately thirty such institutions, he learned that only a very small percentage of them were not using the WISC as a part of their departments' test batteries. Those who did not utilize the WISC stated that this was due to the fact that the test did not have a low enough "floor" for their specific purposes. They had in mind the fact that the lowest possible scores obtainable are forty-five, forty-four, and forty-six IQ on the Verbal, Performance, and Full Scales respectively.

A year after the WISC was published, more information from the original standardization data became available when Seashore, Wesman, Alexander, and Doppelt (14) published their paper. Besides including information which was also included in the test manual, they presented data about sex differences. On the Verbal Scale boys were higher than girls by more than three points at age eight and ages ten through fifteen. On the Performance Scale boys were higher than girls by more than three points at ages eight and ten, and girls were ahead at ages five, six, seven, and nine. On the Full Scale boys were two and one-half to four and one-half points higher at age seven, while girls were ahead by smaller amounts at four other ages. The authors believed that the items chosen may

have been biased slightly in favor of boys; or the sampling of boys may have been chosen with a slight bias. In addition to the sex differences, they also mentioned that although there were fifty-five feebleminded originally, seventy cases, or 3.2 per cent of the total sample, had Full Scale IQs below seventy when all results were tabulated.

The following year (1951) Seashore (13) published information about differences between the Verbal and Performance Scales. He stated that the standardization procedures for the WISC were designed to result in a difference of zero points between the average of the Verbal IQs and the average of the Performance IQs. While the theoretical average subject has a Verbal IQ equal to his Performance IQ, many individual cases can be expected to have relatively large discrepancies between their Verbal and Performance IQs. In fact, equal IQs will probably be rare.

About half of the cases in a random run of children will have differences between these IQs as great as eight points or more. About three-fourths of the subjects will show differences of four points or more. Five per cent will have differences of more than twenty-five points. The results from feebleminded in the sample were also analyzed. Twenty-two had Verbal IQs which were higher than their Performance IQs, three showed no differences, and thirty had Performance IQs which were greater than the Verbal IQs. Seashore believed that all these differences may be due to errors of

measurement, as well as to socio-economic factors.

In the years that followed, other studies appeared in the literature which dealt with various aspects of the WISC when it was administered to mentally subnormal children. A paper by Sloan and Schneider (15) compared the results obtained from forty mentally defective children, twenty males and twenty females, on the Stanford-Binet Scale, Form L, the Arthur Performance Scale, Form I, and the WISC. These subjects were diagnosed as either familial or undifferentiated. They found sex differences in favor of the males but attributed them to the low IQs of females on all tests. The mean IQs indicated that the Performance score was higher than either the Verbal or the Full Scale scores. The authors stated that these findings were, ". . . in accordance with previous studies of mental defectives which have found higher Performance than Verbal IQs to be generally true." Interscale correlations were also presented and indicated that the closest relationship existed between the Performance and the Full Scales. Hence, the Full Scale IQ appeared to be more influenced by the Performance Scale score than by the Verbal Scale score.

A contribution by Stacy and Levin (16) was an analysis of the WISC and the Stanford-Binet with subnormal subjects by correlation techniques. They used seventy institutionalized children who ranged in age from seven years, two months, to fifteen years, eleven months. Forty-five subjects were morons (fifty to sixty-nine IQ)

and twenty-six were considered borderline cases (seventy to eighty-one IQ). They, too, found that the mean Performance IQ was the highest of the three obtained. They, also, obtained their highest correlation between the Performance and Full Scales.

Vanderhorst, Sloan, and Bensberg (17) attempted to determine the degree of agreement between the Wechsler-Bellevue Scale and the WISC. They were especially concerned about relationships obtained when mental defectives with ages within the range where the two tests overlap were used. Their sample consisted of thirty-eight boys and girls who were diagnosed as either undifferentiated or familial. The IQ scores they obtained from the WISC again indicated that the Performance Scale mean score was the highest. Mean subtest scores were also computed by the authors and indicated that Object Assembly, Picture Completion, and Similarities were the highest. The lowest mean scores were obtained for the Vocabulary, Comprehension, and Information subtests. Standard deviations were not given, and with only thirty-eight subjects involved, it was difficult to determine whether these relationships would hold up if results from a much larger group of subjects were analyzed.

Newman, Loos, and Frank (11) also attempted to determine differences between Verbal and Performance WISC IQs with mentally defective children. Their N of 231 was much larger than the Ns in the studies (15, 16, 17) mentioned above. Included were 128 familials, 75 undifferentiated, and 28 brain-damaged. The age range

was seven to sixteen years, and no subject was included unless he had an IQ of fifty or higher. The statistical analyses of Newman and Loos with the WISC subtest scores yielded results from which the following tentative conclusions were made:

1. Familials perform significantly higher as a group on the Performance subtest than on the Verbal subtest.

2. Undifferentiated mental defectives also perform significantly higher as a group on the Performance than on the Verbal Scale, but the mean difference was not as great as for the familials.

3. Brain-damaged cases due to infection or birth trauma show no difference between Verbal and Performance IQs.

4. Brain-damaged perform uniquely on the WISC as a group to the extent that they obtain a higher Verbal IQ and lower Performance IQ than the undifferentiated group.

The authors determined that less than half of any differences found between Verbal and Performance IQs will be significant differences. They caution that when considering the individual case, only the largest differences should be considered as trustworthy and small differences attributed to errors of measurement.

In a study by Sandercock and Butler (12), they did not report the usually found significantly higher Performance IQs. An analysis of the results obtained from their ninety subjects indicated that the mean Verbal and Performance IQ scores were quite similar. They also presented data on subtest variability and stated that, "The

study of subtest variability in the WISC was made in terms of sign or deviations of individuals from their mean performance. These signs indicate a trend for individuals in the mentally defective group to have high scores on Similarities, Digit Span, Picture Completion, Block Design, and Object Assembly in comparison to low scores on Information, Arithmetic, Vocabulary, Picture Arrangement and Coding." Due to variation among signs, the authors felt that it was not possible to establish a definite sign pattern for the mental defective group. Guthrie and Pastovic (10), in their study which considered the validity of the WISC, found that their data and that of three other studies cited, indicated a higher mean Performance IQ than Verbal IQ over a wide range of intelligence.

Beck and Lam (8) used the WISC results obtained from 104 children in order to evaluate the possibility of predicting organic deficit. The children, aged six to fifteen years, eleven months, were all referred to a state agency by public schools because of the possibility of placement into special classes for the educable mentally handicapped. They found that:

1. Organics tend to score lower on the WISC Full Scale than non-organics.

2. Organics tend to do more poorly on the WISC Performance and Full Scales than on the WISC Verbal Scale.

3. The possibility of organicity increases considerably as IQ drops below the borderline range, i.e., seventy to eighty on

the WISC.

The authors felt that the following factors should be taken into consideration in any further study of this type:

1. Mentally handicapped organics have such low scores that there is less chance for variation in the subtest scores.

2. At the lower age levels the subject may receive a scaled score even though his raw score is zero.

3. Different types of organics may offset each other's scores as some types may do better than others on certain subtests and vice versa.

4. Children haven't developed intellectually as adults and the same tests won't necessarily hold up after da age.

While the results presented by Sandercock and Butler (12), above, indicated that the Verbal and Performance IQs were approximately the same, Atchison (6) presented results which indicated that the Verbal IQ was higher than the Performance IQ. He tested eighty mentally defective, Negro children within the age range six years, eight months to thirteen years. He concluded that the relationship between verbal scores and performance scores for mentally defective, Negro children may be different from that found in normal, Negro children. These results are contrary to what one would expect and they have not been duplicated by other studies.

In Baroff's recent study (7), in which he was concerned with WISC subtest patterning in endogenous mental deficiency, he analyzed

the results of sixteen Negro subjects who made up part of his N of fifty-three. Eighty-one per cent of these sixteen had higher Performance Scale IQs, which almost duplicated the results obtained from non-Negro subjects, where 79 per cent achieved higher IQs on the Performance than on the Verbal Scale. Baroff commented that Atchison's atypical finding could not be confirmed in his study.

Baroff's patterning analysis, utilizing a rank-order procedure, indicated that the subjects did best on Object Assembly, Block Design, Picture Completion, and Coding. Their poorest performances were on the Vocabulary and Similarities subtests. Some of these findings do not agree with others already reported above (12, 17) and more will be said about these findings below.

These selected studies have indicated some of the areas which have been investigated by various experimenters. For the most part, those using mental defectives as subjects have been interested in WISC subscale differences (6, 10, 11, 12, 13), inter-test relationships (15, 16, 17), and subtest variability (1, 2, 7, 12) in regard to diagnostic patterning. The present study was designed to determine, by an analysis of a large number of WISCs of institutionalized mentally defective children, whether the contributions of the subtests to the total IQ scores were relatively the same for them as they were for non-defectives. A basic statistical characteristic of the WISC is that the normalized distribution of scaled scores sets all subtest means at ten and all subtest standard

deviations at three. The inherent assumption is that each test contributes equally to the total IQ score. It is hypothesized that among defectives the contributions of the subtests, as determined by means and standard deviations, will not be equal; but some will contribute disproportionately more (or less) to the total scaled score and subsequently derived IQ. The present author has observed, e.g., the higher Similarities scores and lower Coding scores in test protocols of many mental defectives. Interpretations made on the basis of WISC results obtained from defectives may be inaccurate and misleading because of these and other possibilities.

The problem of scatter analysis, and its diagnostic implications, was not a major consideration in this study. However, reference to this topic will be made below. The major importance is the determination of what effects the independent variables of sex, clinical diagnosis, and IQ level have on the magnitude and extent of the possible inequalities in mean subtest scores. Thus, the problem was twofold. First, we wished to find, to what extent the subtests varied in regard to their scaled score contributions to the total IQ; second, we attempted to relate subtest inequalities to specific independent variables.

The studies previously reviewed have not done this. Those researchers who did concentrate on subtest patterning related the results to possible diagnostic functions. However, in practice, the diagnosis of mental deficiency usually depends heavily upon

IQ score and not necessarily upon a scattergram. Apparently, it was in this context that Rabin wrote, in the Fifth Mental Measurements Handbook (9), the follcwing in his critique of the WISC: "Serious difficulties in diagnosis of mental deficiency and discrimination in that category [mental deficiency] are noted. Probably a refinement of the scale, especially at the lower end, would add greatly to its usefulness."

Before any attempt may be made to refine the WISC at its lower end, it seemed that information might be obtained in regard to how defectives actually functioned on this test. It is felt that this study may help to answer this question.

In addition to the major hypothesis mentioned above, further hypotheses are presented. The results of a pilot study and the author's personal experiences with mental defectives provided the background. It is hypothesized that:

1. Sex differences may be obtained in subtest results.

2. Variability of subtest scores may be related to magnitude of total IQ scores.

3. Differential results between Verbal and Performance IQs may be obtained for different diagnostic groups, and IQ levels.

CHAPTER II

METHOD OF THE STUDY

In order to attack the problems stated in the last chapter, 713 subjects[1] were used in this study. All were institutionalized mentally defective children, and their WISC results were obtained by a systematic procedure which was as follows:

1. The author compiled a list of state institutions for mentally defective children. The source of the list was a directory which was published by the American Association on Mental Deficiency (4). From this same directory it was also determined whether there were psychologists on the staffs of these institutions. The listings by state and institution in the American Association on Mental Deficiency membership directory (3) and the American Psychological Association directory (5) were also used as cross-references.

2. If a specific state institution did have a Ph.D. psychologist on its staff, its name was retained on the list; if it did not, its name was dropped from the list. Although there were

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[1]Seventy subjects, or approximately 10 per cent of the total N, were Negroes. However, for purposes of this study no differentiation on the basis of race was made. The distribution of these cases in regard to the variables under consideration did not appear to be different in any way.

probably personnel changes, it was hoped that by this screening method the test data requested would have been obtained either directly by, or under the supervision of, a Ph. D. psychologist who was also a member of the American Psychological Association and/or the American Association on Mental Deficiency.

3. Approximately thirty institutions met the requirements stated above. A form letter (see Appendix I), briefly explaining what was desired, was directed to the psychologist at each institution. Fifteen institutions did eventually contribute WISC results. Many others replied, however, and either indicated that they did not use the WISC, or that they did not have the time and personnel to compile the data. Thus, 50 per cent of the institutions contacted responded to the author's request.

4. Once the data were collected, a final screening procedure was carried out. All incomplete WISCs (i.e., those with results from less than the standard ten subtests), and those with prorated IQs, were eliminated from the study. Cases diagnosed as psychotic, even if this diagnosis was secondary to one of mental deficiency, were also eliminated. Seven hundred thirteen cases remained, after this final screening, from the 840 originally collected.

The fifteen institutions (identified by letter), the region of the country in which they are located, and the number of cases which they contributed may be found in Table 1, below.

TABLE 1

CONTRIBUTING INSTITUTIONS, THEIR REGIONAL LOCATIONS, AND THE NUMBER OF ISC CASES CONTRIBUTED

Institution	Region	Number
A	Midwest	393
B	Northeast	61
C	Midwest	38
D	Far West	32
E	Midwest	30
F	Southeast	28
G	Far West	24
H	Northeast	22
I	Midwest	15
J	Southeast	15
K	Midwest	13
L	Northeast	12
M	Midwest	11
N	Northeast	10
O	Far West	9

The data sent to the author for each child were as follows:

1. Ten scaled subtest scores
2. Verbal, Performance, and Full Scale IQ scores
3. Age of child at time of testing
4. Diagnosis
5. Sex

Thus, sixteen variables were recorded for each child. Of these, the first thirteen became the dependent variables of the study, while the last three, along with IQ level, became the independent variables.

The ages of the subjects ranged from five years, one month to fifteen years, eleven months. The mean age was twelve years,

eight months; standard deviation two years, two months. The distribution of ages was skewed to the left. This was not too surprising when it was considered that five, six, and seven year old defective children will often perform on the test in such a manner as to be awarded total scores which fall below the lowest scaled scores listed in the manual (19) for which IQs can be computed. According to the norms in the manual, scaled scores of six, ten, and twenty-six are required in order for a given child to receive the minimum IQs of forty-five, forty-four, and forty-six on the Verbal, Performance, and Full Scales, respectively. The cases which did not meet these three criteria were not included in the study.

The distribution of cases by sex and diagnosis may be seen in Table 2 below. Originally, the diagnostic categories numbered more than the present three (see Appendix II). However, because of the small N which represented many of the diagnoses, and because the author wished to classify the data in categories similar to those used in other studies, the threefold diagnostic division was used. The cases considered as Brain-damaged included those called chronic brain syndrome, epileptic, cerebral palsy, encephalitic, post-infectional, post-traumatic, and brain-damaged.

The Familials included those cases considered and diagnosed as such by the contributing institutions. There were no other diagnostic entities used which fell under this category.

TABLE 2

DISTRIBUTION OF MISC CASES
BY SEX AND DIAGNOSIS

	Brain-damaged	Familial	Other	Totals
Males	103	154	212	469
Females	42	119	83	244
Totals	145	273	295	713

The Other category included those cases diagnosed as undifferentiated, mongoloid, cretin, cranial anomaly, idiopathic, mental defective, etc., and simply other. It should be pointed out, however, that the majority of cases in this category were either those called mental defective or other. The other specific diagnoses made up only a small handfull of cases.

It was unfortunate that this third category was so large. It was, of course, the result of an arbitrary decision on the part of the author, but it also reflects, in part, the difficulty which workers in the field of mental deficiency have had with the problems of diagnosis and classification. Many of the different contributing institutions evidently used their own systems in diagnosing their patients, while others relied upon various psychiatric nomenclatures which were available to them.

Other problems concerned with diagnosis are those of

personnel and equipment. It is speculated, for example, that the physicians who had electroencephalograms available to the, and the institutions which had neurologists on their staffs, may have been less hesitant about calling a child brain-damaged than the physicians and institutions which were not so equipped and staffed. Regardless of equipment, staff, or choice or diagnostic methology, the area of diagnosis remains one of the key problems in the field today.

The IQ levels chosen were four in number and began with forty-six IQ which, as was mentioned above (19), is the lowest possible Full Scale IQ. These levels, and the distribution of cases by sex at each level may be found in Table 3, below. Cases with IQs above that which is ordinarily considered to be the upper limit of mental deficiency (70-75 IQ) were included in the study. This was done in order to make this variable more amenable to study. As can be seen by an inspection of the table, there were relatively more females at the lower IQ levels. Males, on the other hand, were more numerous within the categories 56-65 IQ and 66-75 IQ.

TABLE 3

DISTRIBUTION OF WISC CASES BY SEX AND IQ LEVEL

	46-55 IQ	56-65 IQ	66-75 IQ	75+ IQ	Totals
Males	111	158	131	69	469
Females	76	89	68	11	244
Totals	187	247	199	80	713

All sixteen variables for each subject used in the study were punched and encoded on individual IBM cards. In this way, the 11,408 items which made up the data were accurately and efficiently utilized in the various statistical computations which were considered necessary for this research project.

CHAPTER III

RESULTS AND DISCUSSION

The four hypotheses stated in Chapter II will now be discussed in order to determine whether the obtained data have substantiated them or not. After each hypothesis is dealt with individually, other information and data, obtained in the analysis of the WISC, will be presented.

The main hypothesis stated that subtest scores for mentally defective children may not contribute equally to the total IQ score as it was assumed they would for a sample of normal children. The reader should recall that normalization procedures utilized by Wechsler set all subtest means and standard deviations at ten and three respectively. There was no indication given by Wechsler in the WISC manual to the effect that this equality would not be expected in the performances of defective children.

An inspection of Table 4, below, overwhelmingly indicates that inequality, rather than equality, is the rule in regard to the contributions of the various subtests. The first two columns in this table indicate the ten subtest means and standard deviations for the total sample of 713 children. The obvious variability among these statistics may be noted. Vocabulary and Arithmetic, for example, both have scaled score means which are clearly below those for

TABLE 4

MEANS AND STANDARD DEVIATIONS OF WISC SUBTESTS AND IQs FOR TOTAL SAMPLE AND THREE DIAGNOSTIC CATEGORIES

	Total (N = 713)		Brain-damaged (N = 145)		Familial (N = 273)		Other (N = 295)	
	M	SD	M	SD	M	SD	M	SD
Infor.	3.92	1.42	3.78	1.64	3.83	1.28	4.09	1.40
Comp.	4.60	2.14	4.24	1.96	4.50	2.13	4.89	2.17
Arith.	3.72	1.79	3.43	1.86	3.63	1.65	3.98	1.87
Similar.	5.14	2.30	4.72	2.39	5.08	2.13	5.42	2.36
Vocab.	3.63	1.93	3.67	1.84	3.38	1.83	3.83	2.02
P. Compl.	6.38	2.52	5.82	2.56	6.48	2.41	6.56	2.57
P. Arrange.	4.73	2.64	3.62	2.05	4.83	2.56	5.19	2.80
Bl. Design	5.30	2.57	4.79	2.37	5.54	2.47	5.34	2.71
Obj. Assem.	6.44	2.74	5.35	2.56	6.88	2.50	6.56	2.89
Coding(A&B)	4.22	2.74	3.22	2.51	4.59	2.67	4.37	2.80
V IQ	63.86	8.70	62.49	9.10	63.00	7.83	65.32	9.05
P IQ	68.21	12.12	62.23	11.10	70.03	11.09	69.45	11.23
FS IQ	62.73	9.52	58.65	9.36	63.19	8.41	64.26	11.00

Similarities and Comprehension. The differences are significant beyond conventional statistical levels of confidence. Among the Performance subtests, the Coding mean is lower than the other subtests, to a degree that is plainly significant.

Other significant subtest differences may also be observed in Table 4. The inequalities of subtest contributions to the subsequently derived IQ scores continue through the various diagnostic categories of Brain-damaged, Familial, and Other. When all four categories in the table are considered, it appears that four subtests, Comprehension and Similarities among the verbal tests, and Picture Completion and Object Assembly among the performance tests, are consistently contributing more of the total weighted score than any of the other subtests in their respective scales.

Table 5 indicates the mean subtest scores for four different IQ levels ranging from 46-55 IQ to 75, and above, IQ. Again, it may be seen that Comprehension, Similarities, Picture Completion, and Object Assembly have the highest mean scores in their respective subscales. In fact, they remain the top contributors within their scales through eight other categories (see Tables 6 and 7).

In regard to low scores, one may note that Arithmetic and Vocabulary, among the verbal tests, and Picture Arrangement and Coding, among the performance tests, contribute the least of all to their respective subscale IQs, and, therefore, to the Full Scale IQ.

TABLE 5

MEANS AND STANDARD DEVIATIONS OF WISC SUBTESTS AND IQs
FOR FOUR IQ LEVELS

	46 - 55 IQ (N = 187)		56 - 65 IQ (N = 247)		66 - 75 IQ (N = 199)		76 IQ & Above (N = 80)	
	M	SD	M	SD	M	SD	M	SD
Infor.	3.02	1.25	3.67	1.08	4.59	1.22	5.25	1.38
Comp.	3.19	1.77	4.26	1.69	5.54	1.81	6.69	2.11
Arith.	2.44	1.35	3.45	1.48	4.63	1.56	5.44	1.64
Similar.	3.58	1.88	4.91	2.00	6.07	1.97	7.28	2.09
Vocab.	2.42	1.61	3.35	1.73	4.49	1.68	5.18	1.69
P. Compl.	4.66	2.05	6.02	2.04	7.43	2.28	8.89	2.17
P. Arrange.	2.73	1.56	4.21	2.19	5.95	2.13	7.99	2.39
Bl. Design	3.47	1.92	5.12	2.05	6.07	2.37	8.26	2.25
Obj. Assem.	4.41	2.11	6.13	2.28	7.69	2.33	9.00	2.58
Coding(A&B)	2.55	2.01	3.85	2.42	5.34	2.64	6.46	2.65
V IQ	55.59	5.40	62.14	5.46	69.22	6.24	75.14	7.05
P IQ	55.13	5.46	65.80	6.60	75.83	7.28	87.26	6.93
FS IQ	51.12	2.78	60.36	2.89	69.90	2.81	79.38	2.70

TABLE 6

MEANS OF WISC SUBTESTS FOR MALES AND FEMALES

	Males (N = 469)	Females (N = 244)
Infor.	4.02	3.77
Comp.	4.84	4.18
Arith.	3.87	3.49
Similarities	5.12	5.20
Vocab.	3.86	3.19
P. Compl.	6.61	5.93
P. Arrange.	5.03	4.16
Bl. Design	5.66	4.61
Obj. Assem.	6.62	6.08
Coding(A&B)	3.88	4.87

TABLE 7

MEANS OF WISC SUBTESTS FOR SEXES
AND THREE DIAGNOSTIC CATEGORIES

	Brain-damaged		Familial		Other	
	Males (N=103)	Females (N=42)	Males (N=154	Females (N=119)	Males (N=212)	Females (N=83)
Infor.	3.92	3.45	3.86	3.79	4.17	3.89
Comp.	4.50	3.62	4.70	4.24	5.10	4.36
Arith.	3.60	3.00	3.60	3.68	4.19	3.46
Similar.	4.73	4.69	4.87	5.35	5.49	5.25
Vocab.	3.89	3.12	3.62	3.08	4.01	3.37
P. Comp.	5.98	5.43	6.70	6.18	6.85	5.82
P. Arrange.	3.78	3.24	5.21	4.34	5.52	4.36
Bl. Design	5.02	4.21	6.03	4.91	5.70	4.40
Obj. Assem.	5.50	5.00	7.17	6.50	6.78	6.01
Coding(A&B)	3.19	3.29	4.12	5.19	4.05	5.19

More will be said of the individual subtests and their variabilities and consistencies below. It appears, however, that regardless of how the total N is divided, whether by sex, diagnosis, sex and diagnosis, or IQ level, the same inequalities regarding the subtests' contributions persist.

The second hypothesis indicated that sex differences would be present throughout the results. It is felt that the available data substantiate this. Tables 6 and 7, already referred to above, list the means of the subtests for both sexes, as well as those for the three diagnostic categories (Brain-damaged, Familial, and Other) by each sex. The higher mean scores for the males on most of the subtests are evident, and although not indicated in the tables, this same differential also results in higher IQs for males than for females. From these higher male Full Scale IQs, it must follow that males will score generally higher on the subtests.

The males' IQs were approximately 8 to 10 per cent higher than the females' IQs. Since it was thought that an age difference may have been an underlying factor in regard to the lower female IQs (i.e., if females were significantly older, they may at times, have to score higher to be awarded the same weighted scores as the younger males), mean ages were compared. Females were approximately 2 per cent, or roughly three months, older than the males. This slight difference, then could only partially account for the pervasive differences in favor of males.

An analysis of variance was also completed with the same independent variables of sex and diagnosis. The ten subtest scores were considered as the dependent variable in this analysis. Table 8, following, lists the results and includes the name of the subtest, the independent variables, and the levels of significance of the derived Fs.

The results presented indicate again that sex was a differentiating factor throughout most of the ten subtests. Males scored significantly higher on all the subtests except Similarities and Coding. Females, however, only scored significantly higher on the Coding subtest. Similarities subtest was the only one on which males and females performed at about the same level.

It is interesting to compare the sex differences found in the present study with those presented for normal adults by Wechsler (20) in the fourth edition of his text on the measurement of adult intelligence. Of the eleven Wechsler Adult Intelligence Scale (WAIS) subtests, males did significantly better on five, females did better on three, and three differences were not significant. One of the most significant differences in favor of females was found for the Digit Symbol test. This subtest is comparable to the Coding subtest on the WISC, and it appears that, regardless of age or intellectual level, this type test is easier for females.

To close this discussion of sex differences, a quotation from Wechsler (20) about this topic may be appropriate. He was writing

TABLE 8

RESULTS OF ANALYSIS OF VARIANCE PRESENTED BY VARIABLE
FOR EACH OF TEN WISC SUBTESTS,
SHOWING LEVELS OF CONFIDENCE

	I	C	A	S	V	PC	PA	BD	OA	Cod(A&B)
Sex (M) and (F)*	.05 (M)	.001 (M)	.01 (M)	N.S.	.001 (M)	.001 (M)	.001 (M)	.001 (M)	.01 (M)	.001 (F)
Brain-damaged (1) vs. Familial (2)	N.S.	N.S.	N.S.	N.S.	N.S.	.05 (2)	.001 (2)	.01 (2)	.001 (2)	.001 (2)
Brain-damaged (1) and Familial (2) vs. Other (3)	.01 (3)	.01 (3)	.01 (3)	.01 (3)	.05 (3)	N.S.	.001 (3)	N.S.	N.S.	N.S.

* Letter or number in parentheses indicates the sex or diagnosis which had the significantly higher mean score. Thus (M) represents Males, (F) Females, (1) Brain-damaged, (2) Familials, (3) Other.

about sex differences as they related to tasks used in intelligence tests and said: "It thus appears that among the tasks which may be used for tests of intelligence there are some which are easier (or more difficult) for one or the other of the sexes. Whether these differences are presumptive or the better or poorer endowment in intellectual ability still remains to be decided, but the fact that they exist cannot be questioned."

The third hypothesis presented above indicated that variability of subtest scores may be related to IQ score. It was felt that subjects with low Full Scale IQs would manifest less subtest variability than those subjects whose Full Scale IQs were higher. Reference is again made to Table 5, above, where the means and standard deviations of the ten subtests are presented for each of the IQ levels. A Median Test was applied to the forty standard deviations and four IQ levels in order to determine whether the trend implied by the hypothesis was correct.

The results of the Median Test indicated a chi square value of 3.2, and a value of 7.82 is significant at the .05 level of confidence. Although there was a slight indication that subtest variability was related to IQ score, no clear-cut trend was evident. It is felt that the evidence is conclusive enough to indicate that the hypothesis was not substantiated.

The last hypothesis stated that there may be differences between Verbal and Performance IQs. It was felt that cases in this

study, when classified under different categories, may present results which would indicate that the Verbal and Performance IQs differ significantly. For some time, it has been observed that the defective, usually a familial or an undifferentiated type, will score higher on performance items than he will on verbal items. The data collected and presented in the lower three rows of Tables 4 and 5, will help to determine whether this statement holds true for the present sample.

The Verbal and Performance IQs for the total N, the Brain-damaged, the Familials, and the Other group of subjects may be found in Table 4. An inspection of these scores indicates that the Performance IQs are consistently higher for every group of subjects, except those considered Brain-damaged. For this group, the Verbal and Performance IQs are quite similar. The most significant difference may be found for the Familial group where the Performance IQ is approximately seven points higher than the Verbal IQ.

Table 5 also has information which is relevant to this problem. When the cases are distributed by IQ level, naturally the IQs increase as one goes from the lower to the higher levels. However, a close examination of the Verbal and Performance IQs in this table will indicate that the Performance Scale IQs increase at a more rapid rate from level to level than do the Verbal IQs. The latter increase from a low of 55.59 IQ to a high of 75.14 IQ, while the former increase from 55.13 IQ to a higher, 87.26 IQ.

This information on diagnostic categories and IQ levels indicates that the hypothesis regarding differences between Performance and Verbal IQs is essentially substantiated.

Although the four hypotheses have been discussed above, and the pertinent data presented in each case, additional data will now be presented in order to complete the analysis of the WISC. Intercorrelations were computed for the ten subtest scores for the 713 cases of the total sample, the 145 Brain-damaged cases, the 273 Familial cases, and 295 Other cases. Tables 9 through 12, below, list the intercorrelations obtained from the present data, while Table 13[2] is one of three intercorrelation tables found in the WISC manual (19). This table, which represents results from 200 boys and girls, aged thirteen and one-half years, was chosen because this age is similar to the mean age (twelve years, eight months) of the sample used in this study.

The results indicate that the Wechsler subtest intercorrelations were higher than those presented by the author.[3]

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[2]Adapted from the WISC manual (p. 12) with permission from the author and publisher.

[3]The Wechsler table also includes correlations between subtests and Verbal, Performance, and Full Scale weighted scores, while the author's tables include correlations with IQs rather than weighted scores. The present author's correlations are presented uncorrected for contamination. Intercorrelations for the Digit Span and Mazes subtests (alternate tests) have been omitted from the Wechsler table since they were not part of the present study.

TABLE 9

INTERCORRELATION OF TESTS IN THE WECHSLER
INTELLIGENCE SCALE FOR CHILDREN FOR 713 CASES

	I	C	A	S	V	PC	PA	BD	OA	Cod	V IQ	P IQ
Comp.	.42											
Arith.	.43	.33										
Similar.	.42	.34	.31									
Vocab.	.40	.48	.32	.39								
P. Compl.	.19	.19	.25	.20	.19							
P. Arrange.	.27	.30	.36	.27	.22	.29						
Bl. Design	.13	.14	.23	.13	.10	.29	.34					
Obj. Assem.	.11	.16	.15	.11	.07	.35	.36	.47				
Coding(A&B)	.13	.14	.28	.20	.08	.16	.20	.18	.25			
V IQ	.69	.70	.64	.70	.71	.29	.40	.21	.17	.25		
P IQ	.26	.29	.39	.28	.20	.61	.66	.68	.73	.50	.41	
FS IQ	.53	.55	.59	.55	.51	.55	.65	.56	.58	.49	.79	.87

TABLE 10

INTERCORREIATION OF TESTS IN THE WECHSLER
INTELLIGENCE SCALE FOR CHILDREN FOR 145 BRAIN-DAMAGED CASES

	I	C	A	S	V	PC	PA	BD	OA	Cod	V IQ	P IQ
Comp.	.42											
Arith.	.49	.34										
Similar.	.45	.41	.35									
Vocab.	.37	.54	.37	.38								
P. Compl.	.18	.23	.21	.30	.25							
P. Arrange.	.24	.30	.41	.18	.28	.23						
Bl. Design	.16	.26	.31	.29	.09	.13	.40					
Obj. Assem.	.06	.19	.00	.19	.02	.18	.28	.44				
Coding(A&B)	.18	.27	.30	.31	.19	.14	.23	.37	.19			
V IQ	.71	.71	.71	.74	.68	.34	.40	.35	.12	.37		
P IQ	.21	.40	.39	.40	.25	.53	.63	.72	.64	.61	.50	
FS IQ	.51	.64	.62	.65	.54	.51	.61	.62	.46	.58	.85	.88

TABLE 11

INTERCORRELATION OF TESTS IN THE WECHSLER
INTELLIGENCE SCALE FOR CHILDREN WITH 273 FAMILIAL CASES

	I	C	A	S	V	PC	PA	ED	OA	Cod	V IQ	P IQ
Comp.	.34											
Arith.	.32	.35										
Similar.	.35	.25	.21									
Vocab.	.38	.42	.25	.35								
P. Compl.	.18	.13	.22	.14	.12							
P. Arrange.	.26	.26	.24	.21	.09	.23						
Bl. Design	.14	.15	.25	.07	.14	.25	.24					
Obj. Assem.	.19	.14	.17	.05	.06	.43	.32	.43				
Coding(A&B)	.07	.03	.25	.11	-.03	.11	.03	.14	.16			
V IQ	.65	.69	.61	.66	.67	.22	.30	.20	.17	.12		
P IQ	.29	.24	.37	.20	.14	.61	.58	.66	.73	.48	.35	
FS IQ	.55	.52	.56	.48	.45	.52	.57	.55	.58	.37	.75	.84

TABLE 12

INTERCORRELATION OF TESTS IN THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN WITH 295 OTHER CASES

	I	C	A	S	V	PC	PA	BD	OA	Cod	V IQ	P IQ
Comp.	.46											
Arith.	.45	.28										
Similar.	.44	.36	.34									
Vocab.	.46	.52	.37	.45								
P. Compl.	.22	.19	.28	.19	.21							
P. Arrange.	.31	.31	.42	.34	.30	.33						
Bl. Design	.12	.08	.20	.10	.08	.38	.37					
Obj. Assem.	.15	.16	.20	.10	.11	.35	.38	.49				
Coding(A&B)	.16	.17	.30	.21	.13	.17	.27	.11	.28			
V IQ	.73	.72	.65	.73	.75	.30	.46	.17	.19	.28		
P IQ	.28	.28	.42	.28	.24	.64	.71	.67	.74	.56	.42	
FS IQ	.57	.54	.61	.57	.56	.58	.71	.54	.59	.51	.79	.88

TABLE 13

INTERCORRELATION OF TESTS IN THE WECHSLER
INTELLIGENCE SCALE FOR CHILDREN
AGE 13-1/2 — 100 BOYS AND 100 GIRLS

	I	C	A	S	V	PC	PA	BD	OA	Cod	V IQ	P IQ
Comp.	.61											
Arith.	.59	.46										
Similar.	.67	.61	.50									
Vocab.	.74	.60	.46	.66								
P. Compl.	.35	.25	.26	.36	.31							
P. Arrange.	.35	.31	.25	.44	.41	.35						
Bl. Design	.48	.33	.35	.45	.42	.51	.42					
Obj. Assem.	.29	.13	.20	.31	.33	.55	.42	.63				
Coding(A&B)	.38	.32	.34	.33	.37	.23	.35	.35	.38			
V IQ	.80	.68	.59	.74	.75	.38	.43	.50	.31	.42		
P IQ	.53	.37	.38	.52	.51	.55	.51	.65	.68	.42	.56	
FS IQ	.73	.58	.55	.71	.70	.51	.53	.64	.52	.48	—	—

Four general observations about these intercorrelation tables are presented. These are as follows:

1. Arithmetic was most often the subtest which correlated least with the Verbal Scale I.Q. It also correlated more with some of the Performance subtests than with some Verbal subtests; and it did so more consistently than any other Verbal subtest.

2. Vocabulary was most often the Verbal subtest which correlated most with the Verbal Scale IQ.

3. Coding was most often the Performance subtest which correlated least with the Performance Scale IQ.

4. Object Assembly was most often the Performance subtest which correlated most with the Performance Scale I.Q.

An inspection of the WISC manual indicated that these trends may be found in the data presented for Wechsler's standardization sample as well. There was disagreement, however, between the inter-scale correlations presented by Wechsler and those found in Tables 9, 10, 11, and 12. The Wechsler correlations between Verbal and Performance Scale scores for three different ages (seven and one-half, ten and one-half, thirteen and one-half) were of such a magnitude that Seashore et al. (14) commented as follows: "The correlations . . . are sufficiently high (.60; .68; .56 for the three ages) to indicate considerable common variance, yet are low enough to suggest that the abilities included in the Verbal and Performance Scales cannot be readily inferred from each other."

The four correlations between Verbal and Performance IQs, for total sample, Brain-damaged, Familial and Other, (.41; .50; .35; .42) were of a lower magnitude and indicate less "common variance." Certainly they are low enough to indicate that they are not measuring the same abilities.

This discussion of the intercorrelations completes the analysis of the data. In the summary which follows, various conclusions, based on the extensive data presented above, will be formulated.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The WISCs of 713 mentally defective children were analyzed in order to determine whether specific hypotheses regarding this test would be substantiated. The major hypothesis suggested that, among defectives, the contributions of the subtests in the WISC may be unequal. This is contrary to the inherent assumption of equality made by Wechsler, since he arbitrarily set all subtest means at ten, and all subtest standard deviations at three.

Data presented in Chapter III did substantiate this hypothesis. It was observed that certain subtests were significantly higher (or lower) than others. Comprehension and Similarities, for example, were two verbal subtests which were consistently higher among the verbal subtests. On the other hand, Arithmetic and Vocabulary were consistently lower among the verbal subtests.

The Performance Scale had its consistent inequalities also. Picture Completion and Object Assembly were consistently higher among the Performance subtests, and Picture Arrangement and Coding were consistently lower among the performance subtests.

The subtest contributions were obviously unequal, and differences among the means were of such a magnitude as to be significant beyond the conventionally accepted levels of confidence. These

inequalities were found among the standard deviations as well, since there were definite indications of variability among these measures.

The second hypothesis stated that sex differences may be found among subtest results. An analysis of variance confirmed this by indicating that males scored significantly higher than females on eight of the ten subtests. Females out-performed males on one subtest, and on one other, the two sexes performed about equally. These differences were of a magnitude which could not be influenced greatly by age differences between males and females.

The third hypothesis stated that variability of subtest scores may be related to magnitude of total IQ. This was not confirmed by the results. An analysis of the subtests' standard deviations, by IQ level, was done with a Median Test. The results indicated that, while there was a slight indication that subtest variability did increase as the IQ increased, this trend could not be considered a significant one.

The last hypothesis was concerned with subscale differences and suggested that differential results between Verbal and Performance IQs may be obtained. This expectation was confirmed. Results for the total sample, the Familial group, and the Other group, indicated that the Performance IQ was significantly higher in each case. The results from the Brain-damaged group indicated that there was no appreciable difference between this group's two subscale scores.

The data obtained when the cases were categorized by IQ

level, indicated that the Performance IQ increased more rapidly, and to a higher level, than did the Verbal IQ. As one ascended in IQ level, in these data, the Performance IQ constituted an increasingly larger factor in the increase of total IQ. The Verbal IQ tended to fall behind the Performance IQ to a more marked degree as all three rose.

The next part of this chapter will be a summary of the results as they pertain to the ten individual subtests.

Information.--This subtest was one which ranked about halfway between the most difficult and the easiest of the five Verbal Scale subtests. Males scored significantly higher on it than did females. The Other group scored significantly higher on this subtest than did the Brain-damaged and the Familial groups. It correlated higher with Arithmetic than with any other Verbal Scale subtest. Its highest correlation among the Performance Scale subtests was with Picture Arrangement.

Comprehension.--This subtest had the second highest mean score among the Verbal Scale subtests. It held second place consistently throughout all the diagnostic, sex, and IQ level categories. Males performed significantly higher than females on this subtest. The cases in the Other diagnostic category scored significantly higher on it than did the Brain-damaged and Familial groups. It correlated higher with Vocabulary than with any other Verbal Scale subtest. Its highest correlation among the Performance Scale sub-

tests was with Picture Arrangement.

Arithmetic.—This subtest had, along with Vocabulary, one of the two lowest mean scores of the Verbal Scale subtests. It held this position (lowest or next-to-the-lowest) consistently. Males scored significantly higher than females on this subtest. The Other group scored significantly higher on this subtest than did the Brain-damaged and Familial groups. Arithmetic correlated higher with Information than with any other Verbal Scale subtest. Its highest correlation among the Performance Scale subtests was with Picture Arrangement.

Similarities.—This subtest had the highest mean score of any Verbal Scale subtest. It apparently was the easiest in the scale, and it remained so throughout all comparisons made. Similarities also was the only subtest in the WISC on which the performances of the males and females were about equal. The Other group scored significantly higher than did the Brain-damaged and Familial groups. Similarities correlated higher with Information (with Vocabulary a close second) than with any other Verbal Scale subtest. Its highest correlation among the Performance Scale subtests was with Picture Arrangement.

Vocabulary.—This subtest was one of two which had lower means than any of the other Verbal Scale subtests. This low position was maintained quite consistently. Males again scored significantly higher than females. The Other group scored higher on it than did

the Brain-damaged and Familial groups. It correlated higher with Comprehension than with any other Verbal Scale subtest. Its highest correlation among the Performance Scale subtests was with Picture Arrangement. This subtest also correlated lower with the Performance Scale IQ than any other Verbal Scale subtest.

Picture Completion.—This subtest was consistently one of the two which had the highest mean score of the Performance Scale subtests. Males scored significantly higher than females on this subtest. Familials scored significantly higher on it than did the Brain-damaged group. It correlated higher with Object Assembly and Block Design than with any other Performance Scale subtest. Its highest correlation among the Verbal Scale subtests was with Arithmetic.

Picture Arrangement.—This subtest had one of the lowest means of the Performance Scale subtests. It maintained this position quite consistently. Males scored significantly higher than females on Picture Arrangement. Familials scored higher than the Brain-damaged group, and the Other group scored highest of the three. It correlated higher with Object Assembly and Block Design than with any other Performance Scale subtest. Its highest correlation among the Verbal Scale subtests was with Arithmetic. Picture Arrangement also was unique in that it correlated higher with the Verbal Scale IQ and the Full Scale IQ than did any other Performance Scale subtest.

Block Design.—The mean of this subtest was in the same position among the Performance Scale subtests as Information was among the Verbal Scale subtests; it was fairly consistently in the middle. Males scored significantly higher than females on this subtest. The Familial group scored significantly higher than did the Brain-damaged group. It correlated higher with Object Assembly than with any other Performance Scale subtest. Its highest correlation among the Verbal Scale subtests was with Arithmetic.

Object Assembly.—This subtest, and Picture Completion, had higher means than any of the others in the Performance Scale. This position was maintained consistently. Males scored higher than females. The Familial group scored significantly higher than did the Brain-damaged group. It correlated higher with Block Design than with any other Performance Scale subtest. It also correlated higher with the Performance Scale IQ than any other Performance Scale subtest. Its intercorrelations with the five Verbal Scale subtests were lower than those of any other Performance Scale subtest.

Coding.—This was the one subtest which consistently had the lowest mean score of any Performance subtest. It apparently was quite difficult for most of the subjects to whom it was administered. It was also the only subtest in the WISC on which females scored significantly higher than males. The Familial group scored significantly higher than did the Brain-damaged group. Its correlations with other Performance Scale subtests were rather low, and it had the

lowest correlation with the Performance Scale and Full Scale IQs of any of the Performance Scale subtests. It correlated higher with Arithmetic than with any other Verbal Scale subtest.

When the scales themselves are considered, it may be stated that the Performance Scale IQs were generally higher than the Verbal Scale IQs. However, among the Brain-damaged, the IQs were approximately equal. Males had higher Verbal and Performance Scale IQs than the females. The Performance Scale IQ correlated highest with the Full Scale IQ.

In light of the data presented above, it appears that certain subtests have a rather anomalous position within their respective scales. Arithmetic and Picture Arrangement have both been responded to by the present sample of defectives in a rather atypical fashion. Their low mean scores, low intercorrelations with other subtests in their respective scales, and relatively higher correlations with subtests in the opposite scales, are some of the more obvious discrepancies.

The dubious status of the Coding subtest in the WISC should also be mentioned. As the results indicated, when mental defectives are tested with it, Coding does a rather poor job of measuring whatever the WISC is purported to measure. It had the lowest mean score of any subtest in its scale. It correlated quite poorly with other Performance Scale subtests. Its correlations with the Performance Scale and Full Scale IQs were lower than the equivalent correlations

of all other subtests with their respective subscale IQs, and with the Full Scale IQ. A possibility worth considering, in regard to this subtest, is that Coding A, given only to those eight years old or younger, may be more appropriate for testing mental defectives than the more difficult Coding B. Future research may help to answer this question.

It was stated in Chapter I, that although it was not a major consideration of the present research, some comment would be made regarding diagnostic patterns and scattergrams. No attempt was made to indicate, by deviations from the mean, rank-order procedures, etc. which pattern of subtests best exemplifies the mentally defective child. However, merely by utilizing the data presented in this paper, some type of identifying pattern will be presented for consideration.

Generally speaking, a "typical" defective child, regardless of sex, IQ level, or diagnosis, may be expected to score relatively higher on the Comprehension, Similarities, Picture Completion, and Object Assembly subtests. This child may also be expected to score relatively lower on the Arithmetic, Vocabulary, Picture Arrangement, and Coding subtests. Other studies (7, 12, 17) have presented different patterns. In fact, one such study (7), which analyzed the results of fifty-three defective children, listed Coding as one of the easier tests, and Similarities as the most difficult.

A familial mental defective may, according to the results,

be differentiated from a brain-damaged defective on the basis of higher scores on all five Performance Scale subtests. This also means that the familial will probably have a higher Performance Scale IQ than his Verbal Scale IQ. The brain-damaged are not expected to show this difference.

The Other group scored significantly higher than the Brain-damaged and Familial groups on the five Verbal Scale subtests. Only one significant difference was noted, favoring the Other group, among the Performance subtests. However, since the Other category included cases of mixed and doubtful diagnoses, one cannot say with certainty what type of cases were involved—except that they were defective.

This information regarding diagnostic patterns is presented merely as an obvious extension of the obtained results. No degree of validity is placed upon it beyond that which was inferred when the data were presented, above.

The WISC will continue to be used by professional psychologists, and others, to evaluate the intelligence of mentally defective children. Some have indicated (see Chapter I) that they have found the WISC to be unsuitable for their purposes. Others have indicated that, in its present form, this test does not adequately assess the intellectual capacities of mental defectives. It is hoped that this study will shed some light on this problem and will clarify those aspects of the test which may need revision. If

revision is not feasible, certainly the realization that test results from defectives are not to be considered in the same fashion as those from normals, will enable workers to assess, evaluate, and predict the intellectual aspects of mental deficiency in a more adequate and valid manner.

This author cannot, at this point, determine why the various inequalities and differences were manifested. It would be strictly speculation to state: that certain subtests may have been difficult for defectives because of the differential effect of education; or that another subtest was relatively easy because of the specific scoring procedures for it; or that the contents of certain tests seemed to be beyond the scope of comprehension for the group under discussion. These statements can only be presented as possibilities for future research in this field.

APPENDIXES

APPENDIX I

C O P Y

FLORIDA FARM COLONY
R. C. Philips, Superintendent
Gainesville, Florida

Dear

In order to accomplish a certain piece of important research, it is necessary that we have for study, the results of the Wechsler Intelligence Scale for Children. Letters, similar to this, have been sent to a large number of institutions which deal with mentally defective children, requesting either one of the following:

a) A number of fully administered WISCs which they would be able to send to us, or because this may not be possible in many cases;

b) The statistical information from the WISC blanks which can be recorded on the enclosed sheets and mailed back without the need of sending the original blanks.

In either case, the information which we request is as follows: 1) All scaled sub-test scores; 2) Verbal, Performance, and Full Scale total scaled scores and equivalent IQs; 3) Sex of child; 4) Chronological age at time of test; 5) Number of years in institution at time of test; 6) Clinical and/or medical diagnosis.

We realize that your Psychology section is probably occupied with their own assignments but hope that they will be able to find time to cooperate with us in this matter. The test blanks, if sent, will be back in the hands of the sending institution within five days from the day we receive them, and upon subsequent publication of the completed research, a copy will be sent to each contributing institution.

Sincerely,

/s/

A. E. Alper
Acting Director
Psychology Department

APPROVED BY:

/s/ R. C. Philips
SUPERINTENDENT

APPENDIX II

KEY FOR DIAGNOSIS

Please use one or more of the following for your diagnosis:

FA	for Familial
BI	for Brain-Injured
CP	for Cerebral Palsy
Cong.	for Congenital
Epi.	for Epilepsy
HC	for Hydrocephaly
MC	for Microcephaly
Mong.	for Mongoloid
PE	for Post-Encephalitic
PPO	for Phenyl Pyruvic Oligophrenia
PM	for Post Meningitic
PT	for Post Traumatic
MR	for Mental Retardation
Sp.	for Spastic
Oth.	for other types not listed above.

EXAMPLES: 1) MR - HC, Cong. = Mental Retardation secondary to Hyrdocephaly, congenital.

2) MR - Mong. = Mental Retardation secondary to Mongolism.

3) MR, FA = Mental Retardation, Familial

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BIOGRAPHICAL SKETCH

Arthur Eugene Alper was born in Brooklyn, New York, January 5, 1928. He attended Public School 153, Arthur J. Cunningham Junior High School, and Abraham Lincoln High School in this city. He graduated from the latter institution in 1945.

Upon graduation from high school the author enrolled at the University of Florida where he received his Bachelor of Arts degree in 1949 and his Master of Arts degree in 1950.

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While at the University, Mr. Alper was a member and president of Nu Rho Psi Psychology Club. He is presently a member of the American Psychological Association, the American Association on Mental Deficiency, and the Florida Psychological Association. He is also a charter member of Gamma Theta Chapter of Tau Kappa Epsilon fraternity and a member of the United States Air Force Reserve.

Mr. Alper was employed as an Assistant Psychologist at Sunland Training Center, Gainesville, Florida, and recently completed a one year internship at the Veterans Hospital in Augusta, Georgia. He is presently Instructor and Staff Psychologist in the Department of Psychiatry and Neurology at the Medical College of Georgia, Augusta, Georgia.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

January 30, 1960

A H Gowdy
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